Reducing load of LA-MRSA on a pig farm
a simulation study

Sørensen, Anna Irene Vedel; Halasa, Tariq

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UNIVERSITY OF COPENHAGEN

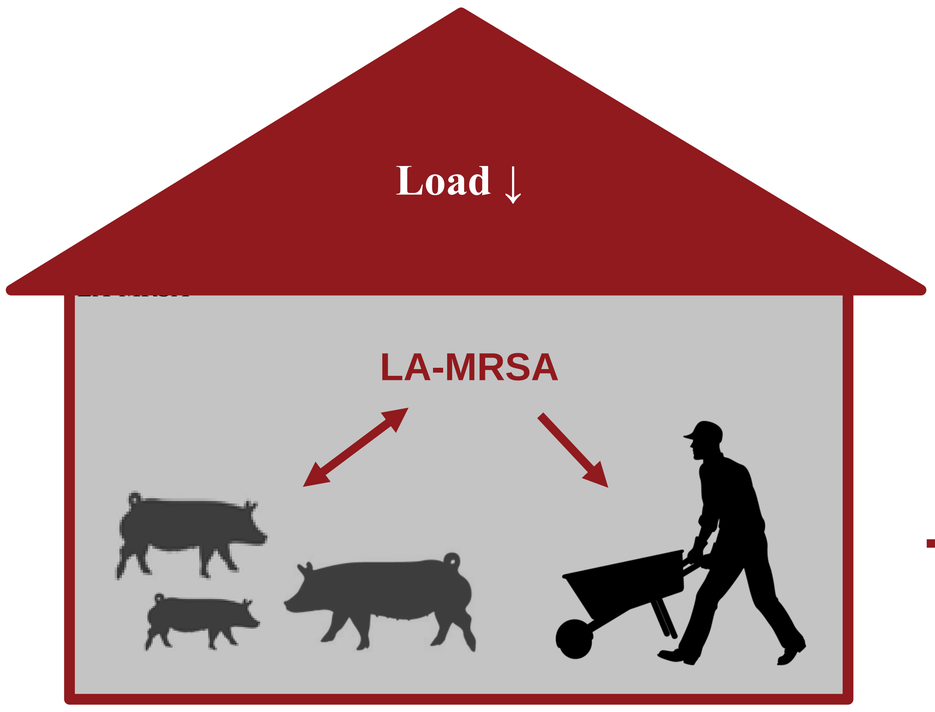
DEPARTMENT OF VETERINARY AND ANIMAL SCIENCES

Reducing load of LA-MRSA on a pig farm – a simulation study

Anna Irene Vedel Sørensen & Tariq Halasa

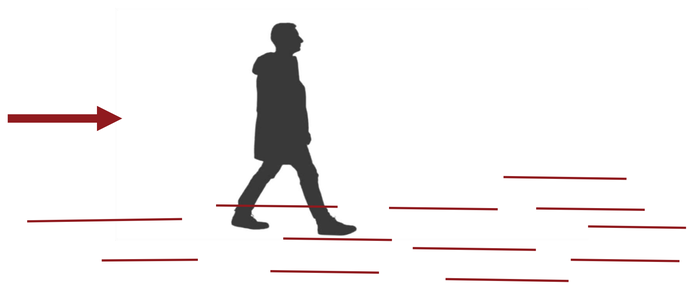
Background

- Livestock-associated Methicillin-resistant *Staphylococcus aureus* (LA-MRSA) is an opportunitic human pathogen
- It is widespread in the Danish pig population, where 88% of a random sample of pig production farms were tested positive in 2016
- At present there is a lack of succesful intervention strategies against LA-MRSA other than complete depopulation of the farms



Main idea

- Reducing the load of LA-MRSA in the barn air → reduced LA-MRSA exposure for those entering the pig barns
- It is the hope that this will lead to less spread of LA-MRSA into the general population, which includes more vulnerable individuals



Materials and methods

- This model is an extension of a mechanistic model, described in Sørensen et al, 2017
- Load has been semi-quantitatively inluded in the form of five different load classes
- The parameterisation of load in pigs and air was based on data from Hansen et al and Bækbo et al (both unpublished)

Preliminary results

- The level of LA-MRSA in the air, and thereby human exposure seems to vary considerably between rooms and over time (Fig. 1)
- After implementing single interventions that led to one- or two-log reductions in the nasal load carried by the pigs, the prevalence of LA-MRSA positive pigs will quickly again reach the level prior to intervention (Fig. 2). A continuous effort seem to be required (Fig. 3)
- A word of caution: At present, we have no knowledge of the true impact of load on the ability of pigs to spread LA-MRSA to other pigs. Therefore, the weighting of the different load classes orginate from calibration to the original model (without load), which was parameterised using transmission rates from a longitudinal study (Broens et al, 2012)

References

- Broens et al. Longitudinal study on transmission of MRSA CC398 within pig herds. BMC Vet Res. 2012;8: 58.
- Sørensen al. A mechanistic model for spread of livestock-associated methicillin-resistant *Staphylococcus aureus* (LA-MRSA) within a pig herd. PLoS One. 2017;12: e0188429.

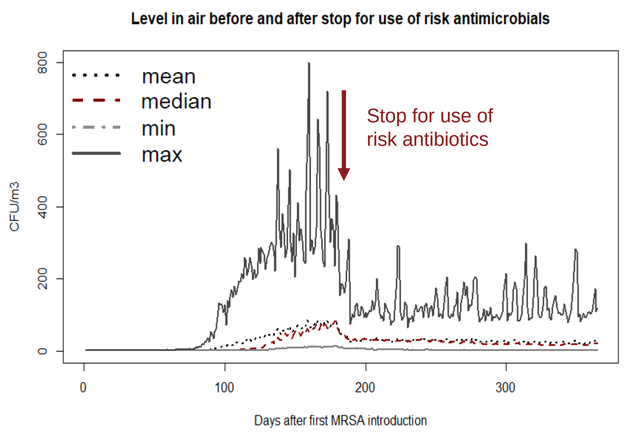


Figure 1: Mean, median , min. and max. level of LA-MRSA in barn air, when use of risk anticirobials are terminated 180 days after LA-MRSA was introduced

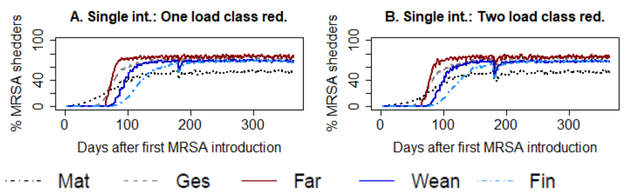


Figure 2: The effect of single interventions reducing the load on the prevalence of LA-MRSA positive pigs in the five stable units

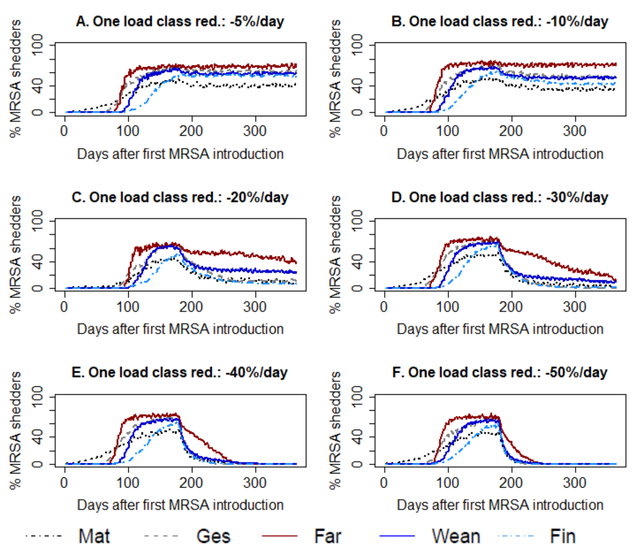


Figure 3: The effect of continuous interventions, which reduce the load by one load class in a gradually larger proportion of the pigs

University of Copenhagen
Faculty of Health and Medical Sciences
Department of Veterinary and Animal Sciences
Section for Animal Welfare and Disease Control

Grønnegårdsvej 8
1870 Frederiksberg C
Denmark

Corresponding author:

Anna Irene Vedel Sørensen
Postdoc

Email: anvso@sund.ku.dk